Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

CIRCULAR No. 50, SECOND SERIES.

United States Department of Agriculture,

DIVISION OF ENTOMOLOGY,

L. O. Howard, Entomologist.

LIBRARY
RECEIVED
JUL 17 1902
U. S. Department of Agriculture.

THE WHITE ANT

(*Termes flavipes* Koll.).

By C. L. MARLATT,

First Assistant Entomologist.

[Revised reprint from Bulletin No. 4, New Series, Division of Entomology, U. S. Department of Agriculture, pp. 70-76.]

No insect occurring in houses is capable of doing greater damage than the one under consideration. Its injuries are often hidden and concealed until the damage is beyond repair, and as it affects the

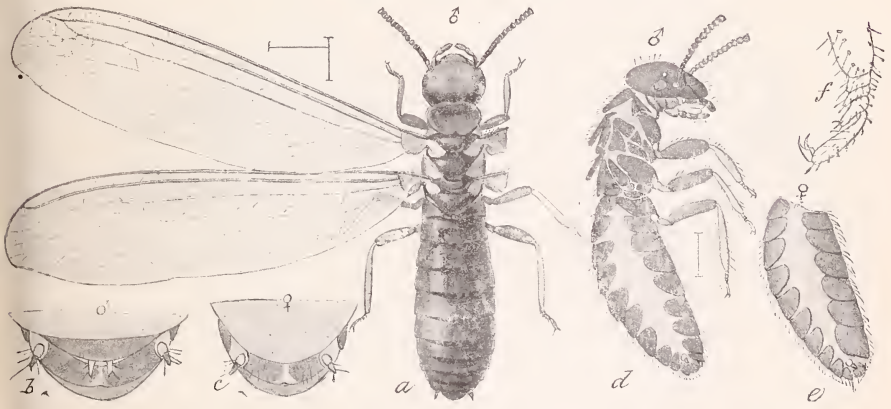

FIG. 1.—*Termes flavipes:* *a*, adult male; *b*, terminal abdominal segments of same from below; *c*, same of female; *d*, male, side view, somewhat inflated by treatment with ammonia; *e*, abdomen of female, side view; *f*, tarsus, showing joints and claw; *a*, *d*, *e*, enlarged; *b*, *c*, *f*, greatly enlarged (original).

integrity of the building itself as well as its contents, the importance of the insect becomes very evident. Fortunately it is not often present in the North in houses, but as the Tropics are approached the injuries from it in dwellings or other structures of wood are of common experience and often of the most serious nature, causing the sudden crumbling of bridges, wharves, and settling of floors or buildings.

The term "white ant," by which this insect is universally known, is entirely inappropriate in so far as it indicates any relationship with the true ants. Strictly speaking, the white ant is not an ant, but belongs with the Neuroptera and is allied to the dragon flies and May flies. The only analogy with ants is in superficial resemblance

and in the social habits of the two groups, in which great similarity exists. The popular acquaintance with the termite or white ant is mainly derived from witnessing its nuptial spring flight, when the small, brown, ant-like creatures with long glistening white wings emerge from cracks in the ground or from crevices in buildings, swarming out sometimes in enormous numbers, so that they may often be swept up by the quart. These winged individuals are not the ones which do the damage, but are the colonizing form. The real depredators are soft-bodied, large-headed, milky-white insects, less than a quarter of an inch in length, which may often be found in numbers under rotting boards or in decaying stumps. These last are the workers and soldiers (fig. 4, *c* and *d*), and constitute the bulk of the colony for most of the year, the winged migrating forms, consisting of the sexed individuals, appearing normally only once a year, usually in April or early in May.

The white ants present, in an entirely distinct order of insects, another of those most curious problems of communal societies which find so many examples among the ants, bees, and wasps. A colony of white ants includes workers, soldiers, the young of the various forms, and, at the proper season of the year, the winged males and females; also a single parent pair, the specially developed king and queen. In the case of the common white ant of this country (*Termes flavipes*), the fully developed queen or mother of the colony, swollen to great size by her enormous ovary development, and her consort, the fully developed but much smaller king or male, have never been found in the white ant communities, and this in spite of the great numbers of the flying stage of both sexes that appear every spring. The soldiers or workers are degraded or undeveloped individuals of both sexes, differing in this respect from ants and bees, in which the workers are all undeveloped females.

The economy of the termites is almost exactly analogous to that of the ants and bees. The workers attend to all the duties of the colony, make the excavations, build the nests, care for the young, and protect and minister to the wants of the queen or mother ant. In this they are assisted somewhat by the soldiers, whose duty, however, is also protective, their enormous development of head and jaws indicating their rôle as the fighters or defenders of the colony. Both the workers and soldiers are blind. The colonizing individuals differ from the others in being fully developed sexually and in possession of very long wings, which normally lie flat over each other, the upper wings concealing the lower, and both projecting beyond the abdomen. These wings have a very peculiar suture near the base, where they can be readily broken off, leaving mere stumps. At the time of the spring flight the winged individuals emerge from the colony very rapidly, frequently swarming in clouds

out of doors, and after a short flight fall to the ground and very soon succeed in breaking off their long, clumsy wings at the suture referred to. In this swarming or nuptial flight they come out in pairs, and under favorable conditions each pair might become especially developed, as described above, and establish a new colony, but in point of fact this probably rarely, if ever, happens. They are weak flyers, clumsy, and not capable of extensive locomotion on foot, and are promptly preyed upon and destroyed by many insectivorous animals, and rarely indeed do any of the individuals escape.

Theoretically, if one of these pairs succeeded in finding a decaying stump or other suitable condition at hand, they would enter it, and the king and queen, being both active, would attend to the wants of the new colony and superintend the rearing of the first brood of workers and soldiers, which would then assume the laborious duties of the young colony. Thereafter the queen, by constant and liberal feeding and absolute inaction, would increase immensely, her abdo-

FIG. 2.—*Termes flavipes: a*, head of winged female viewed from above; *b*, same from below, with mouth-parts opened out—greatly enlarged (original).

men becoming many hundred times its original size. She would practically lose the power of locomotion and become a mere egg-laying machine of enormous capacity. Allied species whose habits have been studied in this particular indicate an egg-laying rate of 60 per minute, or something like 80,000 per day.

In the absence of a queen, however, white ants are able to develop from a very young larva or a nymph of what would otherwise become a winged female what is known as a supplementary queen, which is never winged and never leaves the colony. This supplementary queen (fig. 4, *a*), for the discovery of which we are indebted to the late H. G. Hubbard, is smaller than the perfect sexed queen, but subserves all the needs of the colony in the matter of egg laying, and is the only parent insect so far found in the nests of the common white ant in this country. Whether a true queen exists or not is, therefore, open to question; if not, all the individuals which escape in the spring and summer migrations must perish, and this swarming would, therefore, have to be considered a mere survival of a

once useful feature in the economy of this insect, now no longer, or rarely, of service.

The normal method of the formation of new colonies is probably by the the mere division or splitting up of old ones—their galleries and branch colonies extending great distances from the home colony—or the carrying of infested logs or timbers from one point to another.

The development of these curious insects is very simple. There is scarcely any metamorphosis, the change from the young larva to the adult being very gradual and without any marked difference in structure. They feed on decaying wood or vegetable material of any sort, and are able to carry their excavations into any timbers which are moistened, or into furniture, books, or papers stored in rooms which are at all moist. Their food is the finely divided material into which they bore, and from which they seem to be able to extract a certain amount of nourishment, probably from the moulds and ferments generated in the moistened vegetable material, since they redevour the same material several times. Bearing out this theory, tropical species are known to grow great mushroom beds artificially on the product of which they largely subsist. The white ants are also somewhat cannibalistic, and will devour the superfluous members of the colony without compunction, and normally consume all dead individuals, cast skins, and other refuse material. They are capable also of exuding a sort of nectar, which is used to feed the young and the royal pair, and which they also generously give to each other.

All except the migrating winged forms are incapable of enduring full sunlight, and the soft, delicate bodies of the workers, soldiers and young rapidly shrivel when exposed. In all their operations, therefore, they carefully conceal themselves, and in their mining of timbers or books and papers the surface is always left intact, and whenever it is necessary for them to extend their colonies it is done only under the protection of covered runways, which they construct of particles of comminuted wood or little pellets of excrement. In this way the damage which they are doing is often entirely hidden, and not until furniture breaks down or the underpinning and timbers of houses or floors yield is the injury recognized. The swarming of winged individuals in the early summer, if in or about houses, is an indication of their injurious presence and warrants an immediate investigation to prevent serious damage later on.

The common termite of America is very widespread, occurring from the Atlantic to the Pacific and from Canada southward to the Gulf. It has been found on the mountains of Colorado and Washington at a height of over 7,000 feet. In prairie regions it may often be seen during the swarming season issuing from the ground at fre-

quent intervals over large pasture tracts, where it must feed on the roots of grass and other herbage. It has also been carried to other countries and is a common and often very injurious enemy of buildings and libraries in Europe. A closely allied and equally injurious European species (*Termes lucifugus*) has also been brought to this country in exchange for ours, but compared with our own species is somewhat rare though already widely distributed. In this country serious damage to buildings from the white ant has not been of common occurrence, especially in the North, except in some notable instances. In Europe our species has caused greater damage, and some years ago gained access to one of the Imperial hothouses at Vienna, and in spite of all efforts to save the building it was necessary ultimately to tear it down and replace it with an iron structure. In this country instances are on record of very serious damage to books and papers. An accumulation of books and papers belonging to the State of Illinois was thoroughly ruined by their attacks. A school library in South Carolina, which had been left closed for the summer, was found on being opened in the autumn to be completely eaten out and rendered valueless. In the Department of Agriculture an accumulation of records and documents stored in a vault which was not thoroughly dry, and allowed to remain undisturbed for several years, on examination proved to be thoroughly mined and ruined by white ants. Humboldt, on the authority of Hagen, accounts for the rarity of old books in New Spain by the frequency of the destructive work of these insects.

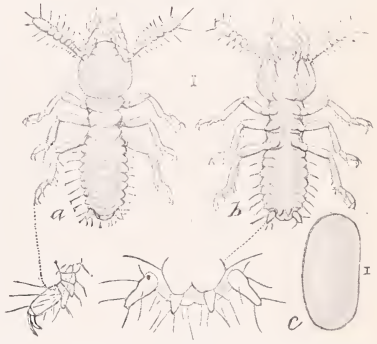

FIG. 3.—*Termes flavipes: a*, newly-hatched larva; *b*, same from below; *c*, egg—all enlarged to same scale (original).

Numerous instances of damage to underpinning of buildings and to timbers are also on record. The flooring of one of the largest sections of the United States National Museum was for some years annually undermined and weakened by a very large colony of these pests which could not be located, and finally the authorities solved the problem by replacing the wood floor with one of cement. A few years ago it was found necessary to tear down and rebuild three frame buildings in Washington in consequence of the work of this insidious foe.

Damage of the sort mentioned has occurred as far north as Boston, but, as stated, greatly increases as one approaches the Tropics, where the warmth and moisture are especially suited to the development and multiplication of this insect. There houses and furniture are

never safe from attack. The sudden crumbling into masses of dust of chairs, desks, or other furniture, and the mining and destruction of collections of books and papers, are matters of common experience, very little hint of the damage being given by a surface inspection, even when the interior of timbers or boards has been thoroughly eaten out, leaving a mere paper shell.

While confining their work almost solely to moistened or decaying timbers or vegetable material of any sort, and books and papers that are somewhat moist, they are known to work also in living trees, carrying their mines through the moist and nearly dead heart wood. In this way some valuable trees in Boston were so injured as to make their removal necessary. In Florida they are often the cause of great damage to orange trees, working around the crowns and in the roots of trees. They are sometimes also the occasion of considerable injury to other trees; and quite recently the writer received information of injurious attack on pecan, chestnut, and walnut trees at Augusta, Ga. They also cause loss in conservatories, attacking cuttings and the roots of plants. Such injuries have been brought to our notice several times by florists, and Mr. Chittenden, of this office, informs me that they are apt to attack the large stems of herbaceous plants like geraniums. The source of the Termites in greenhouses is usually the more or less decayed woodwork of the building itself or the plant benches, and they have even been found working in label sticks, the removal of which gave relief from the damage done to plants. In one instance, also, the Termites, coming from the wooden benches, entered potted plants through the drain-hole of the pots. In prairie regions their work is necessarily on the roots and tubers of plants or the stems of grasses or other low-growing plants.

A very common form of injury to potatoes growing in rich soil or where there is a considerable quantity of decaying vegetable matter has often been noted, and the cause for it has been obscure or assigned to insects innocent of the damage. That the white ant is the culprit in this case was discovered by Mr. F. A. Marlatt, who describes the injury to the tubers as having the form of scars or pits covering the surface, the pits varying in shape from irregular holes to long, irregular excavations sometimes extending far into the potato, but commonly to a depth from an eighth to a fourth of an inch. In all cases these pits are more or less overhung and covered by the dead and dying skin, and are also lined with the cellular tissue of potato, showing that the insect cares most for the starch and water of the tuber. Such damage is liable to be found not only in soil rich in vegetable matter but also in newly cleared soil or soil containing the loose and decayed portions of trees, and in the instance cited above was in soil recently cleared of an old apple orchard.

The white ant is not confined to country places, but is just as apt to occur in the midst of towns, and especially in buildings which are surrounded by open lawns containing growing trees and flower beds richly manured.

REMEDIES AND PREVENTIVES.

The first means of protection consists in surrounding all libraries or buildings in which articles of value are stored with clear

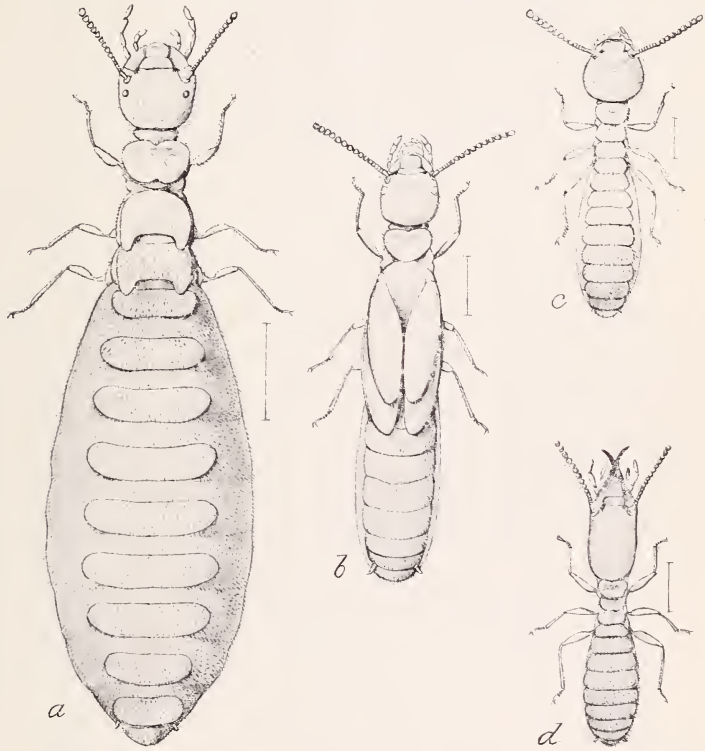

FIG. 4.—*Termes flavipes:* *a*, queen; *b*, nymph of winged female; *c*, worker; *d*, soldier—all enlarged (original).

spaces and graveled or asphalted walks. The normal habit of these insects of breeding in decaying stumps and partially rotted posts or boards immediately suggests the wisdom of the prompt removal of all such material which would otherwise facilitate the formation or perpetuation of their colonies. Complete dryness in buildings is an important means of rendering them safe from attack, and the presence of flying termites at any time in the spring or summer should be followed immediately by a prompt investigation to locate the colony and determine the possibilities of damage. The point of emergence of winged individuals may approximately, though not always, indicate the location of the colony, and if it can be got at by the

removal of flooring or opening the walls, the colony may be destroyed by the removal of the decaying or weakened timbers and a thorough drenching with steam, hot water, or, preferably, kerosene or some other petroleum oil. The destruction of winged individuals as they emerge is of no value whatever; the colony itself must be reached or future damage will not be interfered with in the least. If the colony be inaccessible it may sometimes be possible to inject into the walls or crevices, from which the winged individuals are emerging, kerosene in sufficient quantity to reach the main nest, if the conditions be such as to indicate that it may be near by, and by this means most, if not all, of the inmates may be killed. Where floorings and underpinnings, or books and papers, are badly infested and a wholesale treatment is imperative, the hydrocyanic-acid-gas fumigation is to be recommended, first opening the floors at the neighborhood of the colonies as nearly as can be determined, spreading out the books and opening cases, wardrobes, etc. For full directions see Circular No. 46 of this series.

The flooring of buildings in subtropical and tropical countries should be of cement or stone, or at least the lower timbers and joists should be imbedded in cement, and wherever it proves impossible to prevent damage by the means indicated in a previous paragraph, there is practically no other course than to replace the foundation and floorings with stone, cement, or other form of stone composition. Impregnation with creosote renders wood comparatively immune from their attacks; but this is too costly and difficult a process to come into very general use. A heavy coating with tar of the foundation timbers is often resorted to, and if carefully done protects the wood as long as the coating is intact. Placing the legs of stands, bureaus, etc., not in daily use, in small vessels containing kerosene oil will protect such articles of furniture from the attacks of white ants in the tropics. In the tropics, also, furniture should not lean against or touch the walls, especially in houses of wood, and frequent examinations should be made of libraries and stored papers.

WASHINGTON, D. C., *June 30, 1902.*

○